

## **A Case Study of the Formative Use of Assessment Information in Secondary Science Subjects in Greece**

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### **Abstract**

*Formative assessment (FA) has attracted increasing attention from educators, scholars and policy makers over recent years. A range of research studies has shown the effectiveness of the formative use of assessment information in students' learning. In the Greek educational system, FA and summative assessment (SA) were not separated in classroom assessment in secondary schools until very recently. New regulations in Greece seem to follow the recommendations of the Organisation for Economic Co-operation and Development for balancing external assessments and teacher-based assessments of learning, and integrating student-formative assessments.*

*The aim of this study is to explore the FA practice science teachers use in secondary schools in Greece on a day-to-day basis. A case study approach utilising lesson observations and semi-structured interviews with science teachers was employed to investigate the assessment practices that the participants used on a daily basis, and to evaluate whether they captured the principles of FA. The findings revealed that a few classroom assessment practices that the teachers used on a daily basis reflected some of the principles of FA, but participants emphasised more the summative uses of assessment over formative aspects. Hence, less productive feedback techniques were used by teachers to bridge the gap between the students' current achievement level and the intended learning outcome. Moreover, it revealed that the classroom assessment process is largely teacher-led, while students do not have an active role.*

*To achieve a balance between SA and FA, policymakers and school leaders need to embed the role of FA in educational regulations and to support teachers to apply FA practices in their own teaching through professional development and learning communities.*

### **1. Introduction**

Formative assessment (FA) has attracted increasing attention from educators, scholars and policy makers over the last decade [1]. This is because a range of research studies has shown the effectiveness of FA practices in students' learning [2]. This increased attention on FA has influenced the educational policy strategy of many countries which emphasise ongoing assessment in the classroom to support and promote students' learning [3]. However, collective evidence by researchers in several countries shows that FA practice is beset with problems and appears superficial in most classrooms [4].

This research study focuses on the Greek educational system, which has recently been influenced by the international assessment paradigm, where students' assessments are balanced between teacher-led assessment and external exams. New regulations in Greece seem to follow the recommendations of the Organisation for Economic Co-operation and Development [5] for "balancing external assessments and teacher-based assessments of learning, and integrating student-formative assessments" (p. 47).

The overall aim of this research is to examine the formative use of assessment practices that a number of Greek science teachers apply on a daily basis and how far they are from the principles of FA, as referred to in the literature. Moreover, the research seeks teachers' perspectives about their own assessment practices, so as to draw a bigger picture about the purpose and function of these practices.

### **2. Literature review**

FA is intended to enhance teaching and learning. Because of the broad scope of this assessment and the practices that it introduces, a range of definitions have been formed by scholars to capture the principles of FA over the years. A critical analysis of these definitions shows that FA is now more likely to be informed by socio-cultural learning theory, with the primary aim of enhancing pupils' learning and motivation [6]. This requires learning to be seen as a shared responsibility between the teacher and the students, so that students have an active involvement in their own learning process [7].

The most recent and comprehensive definition that includes the reconceptualisation of FA theory, which is adapted in this study, is that of Wiliam [7]:

*An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of that evidence.* (p. 43)

FA has many generic principles which are applicable to a wide range of subjects and key stages. In the science context, there are some features of FA which can be specifically honed for science teaching and learning. As Harlen [8, p. 117] argues: "In science, the goals of learning are a combination of the development of conceptual understanding, skills of investigative inquiry and scientific attitudes". Moreover, Cowie [9] argues that the reconceptualisation in science education, from "focusing on exploration and experiment" to "argumentation, model, building, and explanation", is central to learning and knowing science. Reviewing the literature on FA in teaching and learning science, research studies have shown that FA can improve students' understanding and learning in science subjects [2].

Many scholars point out that questioning, dialogue and feedback have a key role for conceptual development in science education and, therefore, FA is seen as a crucial component in this process [10]. Moreover, the role of FA in science education is to emphasise students' reasoning, so that students learn to assess ideas as participants in science, and not resort to telling the teacher what they think that she wants to hear [11]. The purpose of questioning should be to investigate pupils' ideas and misconceptions and promote their thinking [2, 10]. Furthermore, science lessons provide many opportunities for classroom talk. Dialogue is highly important for both teachers and pupils as they gather and use information about how learning is progressing [10]. In addition, student feedback on how their existing conceptions about science relate to the scientifically accepted ones, and helping them to modify their thinking accordingly, is crucial for conceptual development in science education and teaching [12].

### **3. Methodology and research methods**

This study was based on the case-study approach. Case studies are a very popular research strategy in education especially when the research seeks to have a deep understanding of the field and to improve the practice of education [13]. The study sample was selected on the basis of convenience. The participants were five Greek science teachers who work in secondary schools in Athens and the surrounding region. There was one female biology teacher, two male chemistry teachers and two male physics teachers. Two participants had been teaching for 4-6 years, two for 10-12 years and one for more than 22 years. One participant worked at a public school and four worked in three different private schools.

Semi-structure interviews and observations were used as data collection methods. The observations are of paramount significance in this study as I observed a variety of different classroom assessment practices, the timings that teachers used in each practice, the framework used and its action fraction in the lesson. Semi-structured interviews were conducted with the teachers after the observations. The interview schedule included two parts with open questions. The first part involved general questions about the role of FA practices and the second part included questions related to the assessment practices used in the lesson observations.

The data analysis is based on the methodology of Grounded Theory (GT). GT is a well-known process for systematically analysing qualitative data [13, 14].

Additionally, all the participants in my study were volunteers and had the right to withdraw at any time. Moreover, the data collected was completely confidential and kept securely. Finally, as stated, the sampling of the study was opportunistic. Hence, the study does not intend to generalise the findings about the wider population. It is simply a study in itself.

### **4. Data analysis**

According to the teachers' conceptions about the role of assessment in teaching to promote student learning, the majority of teachers shared the idea that they use assessment outcomes to evaluate the productivity of their teaching and to adjust their teaching plans accordingly. It is clear that teachers see their role in managing learning to be about helping students to understand the learning goal and identifying the gap between where the students are and the learning goal. Moreover, through the data analysis, it appears that when teachers identify the nature of the gap between where their students are in their learning and their learning goals, they adjust their teaching plans to bridge this gap. Most said that they covered the topics that their students had not understood again, while only one mentioned

that she tried to use different teaching methods or practices to ensure that students had understood. Teachers also mentioned feeling pressurised for time when they repeated parts of previous lessons. As far as teachers' conceptions about their own assessment practices concerned, in each interview, the researcher asked the participants which assessment practices they usually applied and which they had applied in the observed lesson. What is remarkable here is that three out of five teachers did not mention their questions during the lesson as a form of assessment practice that promotes student learning. None of them mentioned oral feedback, even though these practices were used by most of the participants in the observed lessons. At the beginning of the interviews, most teachers focused only on practices whose outcomes were valued for summative purposes (test, quizzes and oral tests) and shared their perceptions about the rest of their practices only when asked about them. Moreover, it is interesting that, according to teachers, the main purpose of the two most frequent assessment practices is to assess a student's preparation for the current lesson and not their understanding, as was identified in the previous category.

## 5. Discussion

The findings of this case study reveal that the participants used some FA principles that are important in promoting student learning. The majority of participants used 'rich' questions and adjusted their teaching instructions, which are core elements of FA. Nevertheless, participants' approaches were more teacher-directed and students appeared not to have any role in the assessment process. Moreover, feedback practices to bridge the gap in student learning appeared weak. Through this study, though, it is clear that participants faithfully follow the assessment directions and requirements of the Presidential Decrees [15, 16]. These regulations try to keep a balance between FA and SA, but the practices that teachers are required to use focus more on SA. On the other hand, the more recent Presidential Decree [17] introduces aspects that have not been put into practice by all the participants, such as self-assessment and promoting higher-order thinking skills.

## 6. Recommendations

The new regulations in Greece seem to follow the OECD [5] recommendations regarding combining external assessments and teacher-based SA with FA. However, there is no direct reference to FA and its strategies. These regulations give details about the introduction of SA, rather than FA practices that teachers can integrate into their teaching. Thus these regulations restrain the culture of testing and they do not support FA implementation. Moreover, there is still the issue of the missing role of students in the assessment process, which is only mentioned in relation to self-assessment practices, without any other explanation of how this practice can be used and what its purpose is. Hence, more radical and explicit changes are needed to support FA. Examples of policies and resources from other countries where FA is embedded into the national curriculum and teachers' professional-development materials should be taken into account [3].

Moreover, it is important to highlight the role of teachers' professional development. It is true that to change teachers' practices is difficult and may take a long time [1]. Nevertheless, embedding FA is worth the effort because of its beneficial role in students' current and future learning. According to the literature, continuing professional development for teachers, along with classroom-based professional learning and inquiry to foster effective FA, are essential to promote classroom assessment practices [18]. As the experts argue, establishing learning communities in a school or department and observing colleagues' lessons offer excellent opportunities for teachers to exchange and develop knowledge about FA and reflective practices [18].

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